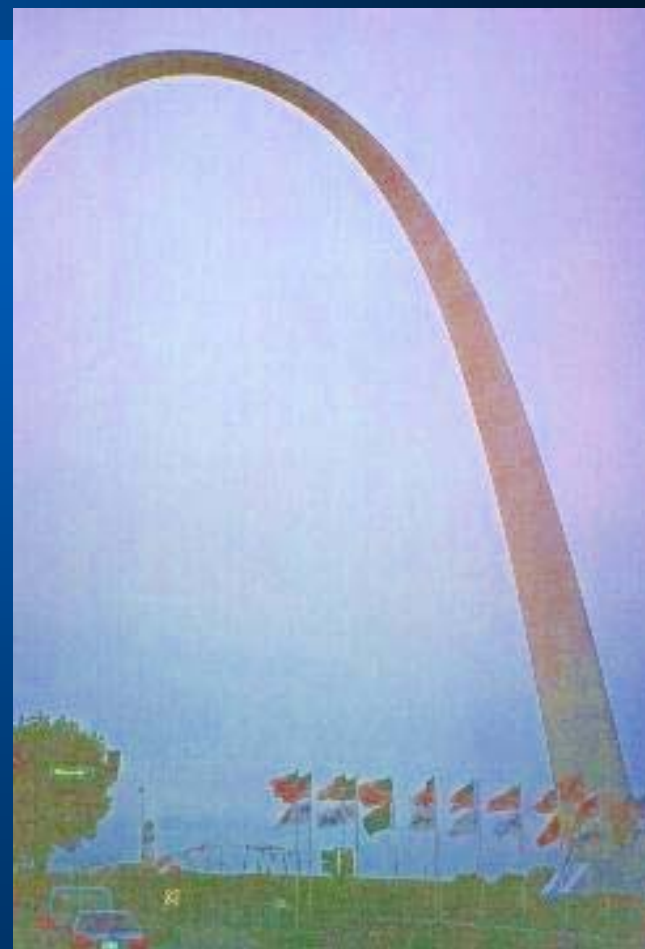


St. Louis Ozone & PM_{2.5} SIP Project Status

- **Project Overview**
 - Description
 - Goals
 - Stakeholders
- **Resources**
- **Project Status**
- **Schedules**
- **Next Steps**
 - Decision Points



John Rustige, P.E.
October 27, 2005

Project Description

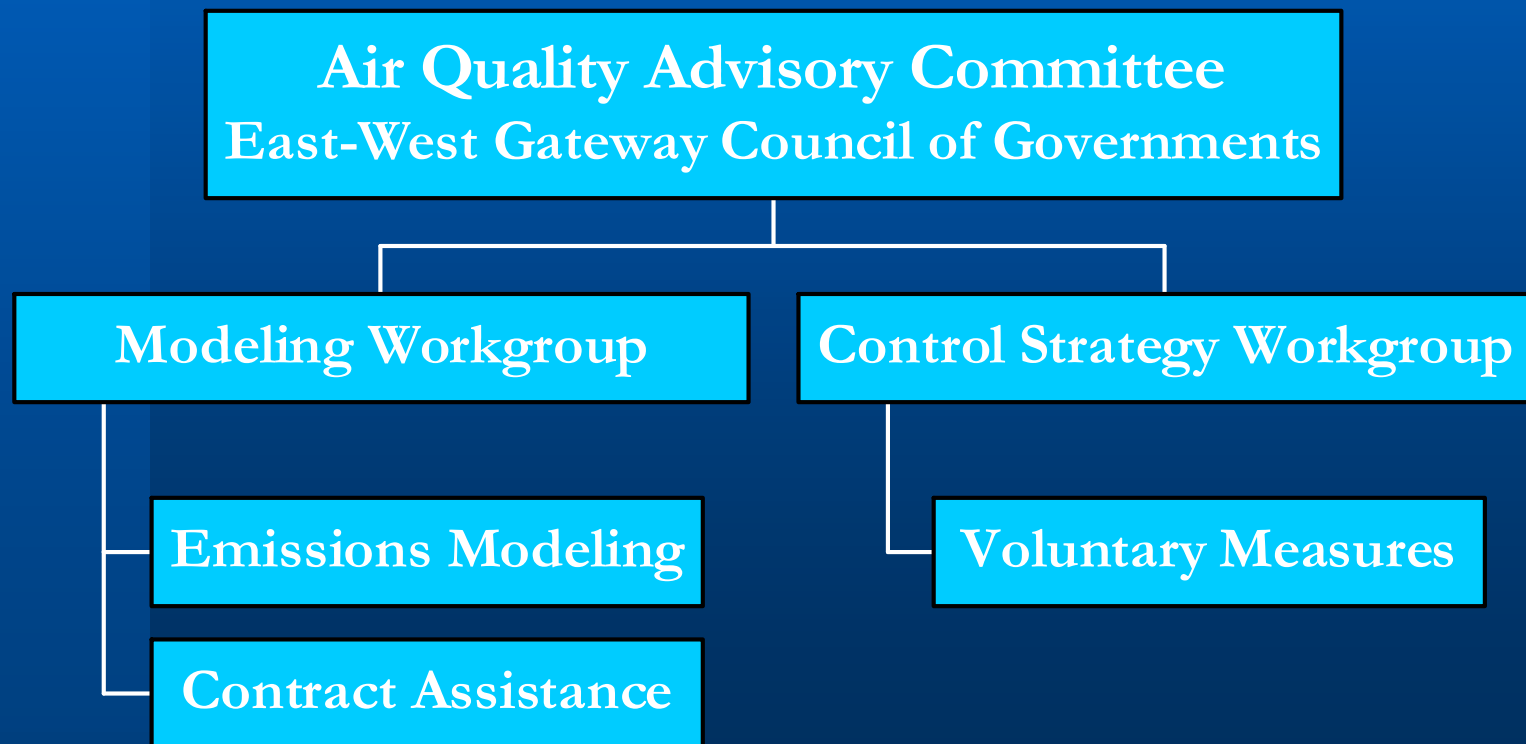
- How far are we from attaining the Standards?
- Geography?
- Dual Pollutant Synergy
- Hazardous Air Pollutant Co-Benefits
- Voluntary Efforts
- Economic Impact

Project Goals

- **Technically Defensible Attainment Demonstration**
- **Cost Effective Control Strategy**
- **Final SIP Document, Complete with Necessary Regulations**
- **Valid Contingency Projects**
- **Stakeholder Input and General Support of the Community**

Stakeholders

St. Louis Ozone & PM2.5



Team/Resources

- People
- Equipment
- Contract Assistance
- Partners
- Stakeholders & Outreach

Project Status

- **Modelers:**

- **Missouri APCP**
- **Illinois EPA**
- **Ameren**
- **EPA**
- **ENVIRON/Alpine Geophysics**

Modeling System

- **Meteorological Model - MM5**
- **Emissions Models - SMOKE and EMS**
- **Photochemical (Air Quality) Models - CAMx and CMAQ**

St. Louis Modeling Domains

MM5 Vertical Layers=34

36 km = 165 x 129

12 km = 265 x 241

4 km = 271 x 235

Total Grid Cells = 5.0 mil

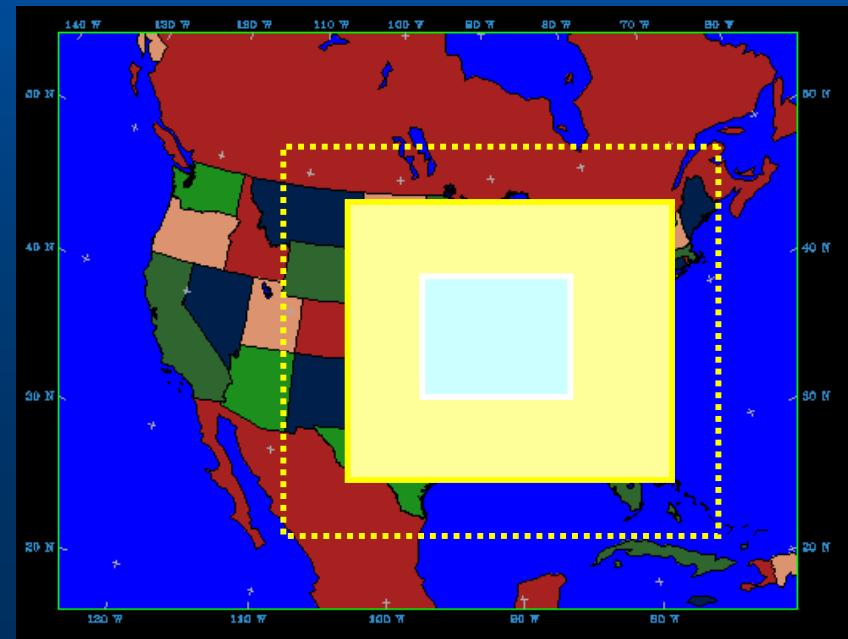
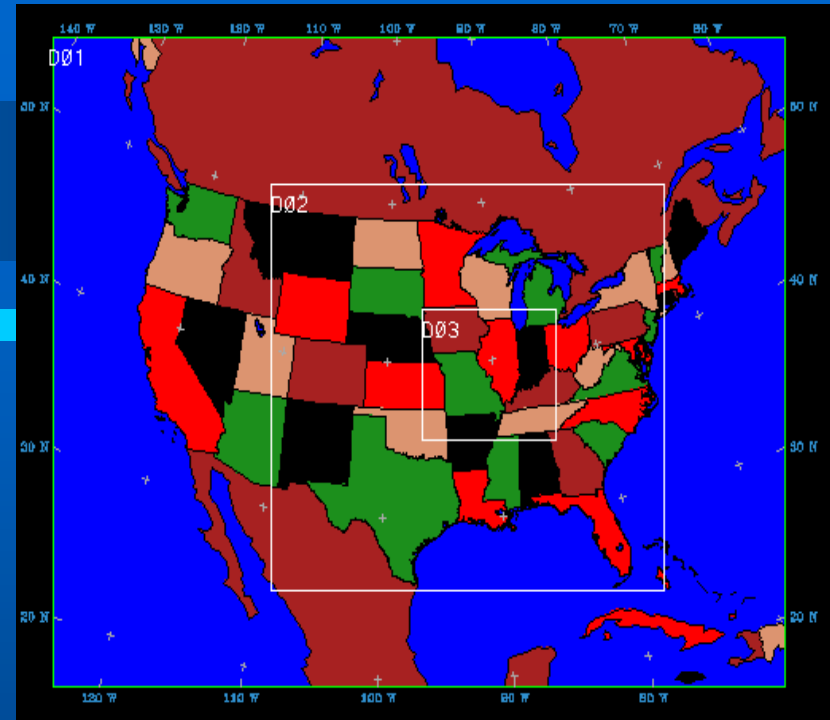
AQ Vertical Layers=16

36 km = 148 x 112

12 km = 203 x 200

4 km = 254 x 218

Total Grid Cells = 1.8 mil



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Days Simulated in Photochemical Models

June 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 2002

July 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 2002

Jul/Aug 29, 30, 31, 1, 2, 3, 4, 5, 2002

Jan/Feb 25, 26, 27, 28, 29, 30, 31, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 2002

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Meteorological Modeling

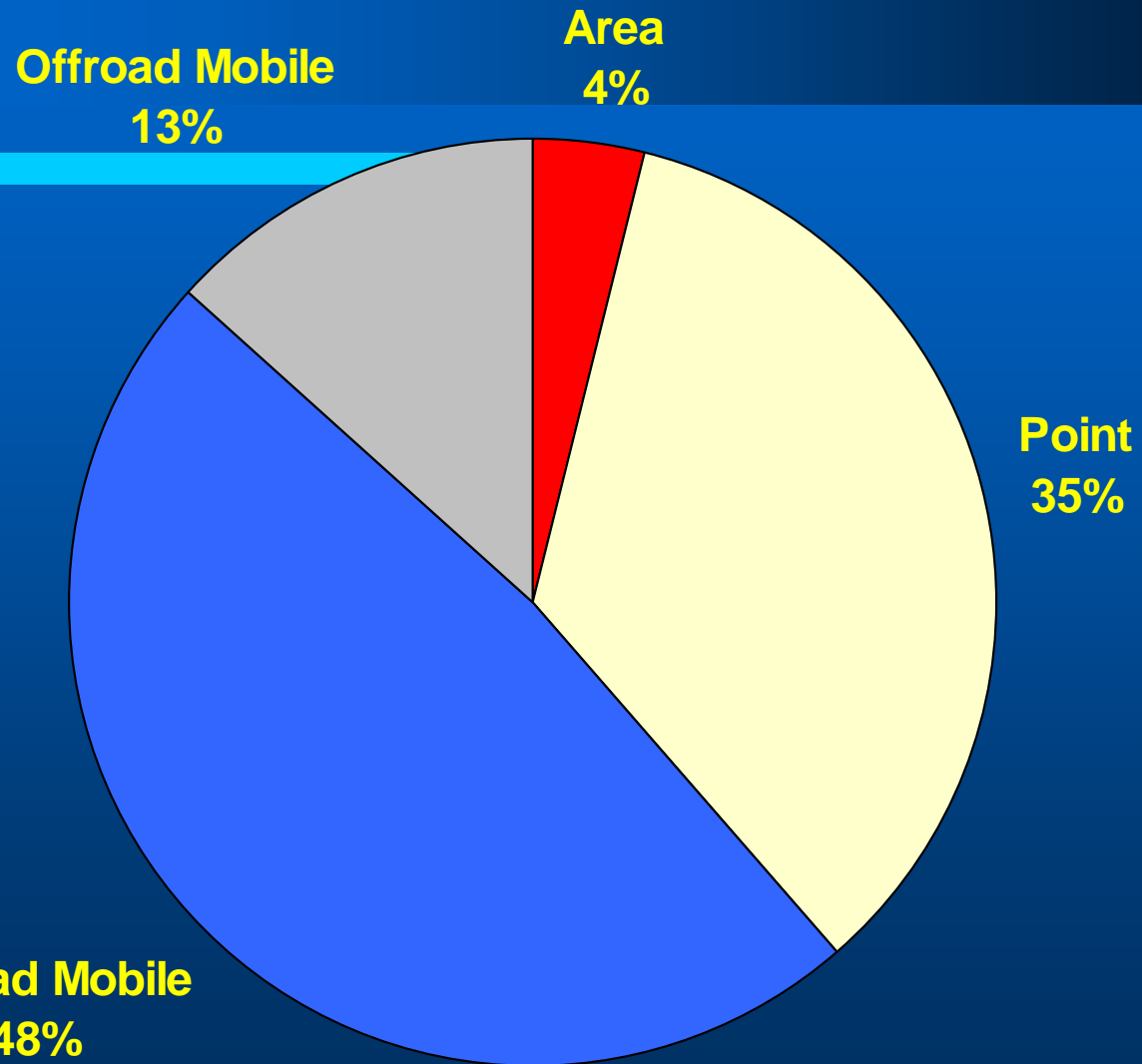
- **Episodic (Ozone)**
 - June 2002; MDNR
 - Jan-Feb and July 2002; IEPA
 - July-Aug 2002; Ameren
- **Annual (PM2.5)**
 - Dec. 15, 2001 - January 2002; Ameren
 - February, April-May 2002; IEPA
 - June - November, 2002; MDNR
 - December 2002; Oklahoma
 - March 2002; EPA Region VII

Base 2 Inventory Improvements

- Incorporated most current inventories from RPOs
- Incorporated CEM data for two Illinois utilities (AmerenUE-Wood River, Dynegy-Baldwin)
- Revised MO recreational marine emissions (MO statewide VOC reduced from ~250 tpd to ~60 tpd)
- Revised area source temporal profiles for consistency with IEPA and US EPA defaults
- Developed facility-specific temporal profiles
- Incorporated Aug. 2005 draft VMT from EW Gateway (~84.3 million DVMT in 8-county area)

2002 Summer Weekday NOx Emissions in St. Louis

Total 550.8 tons/day



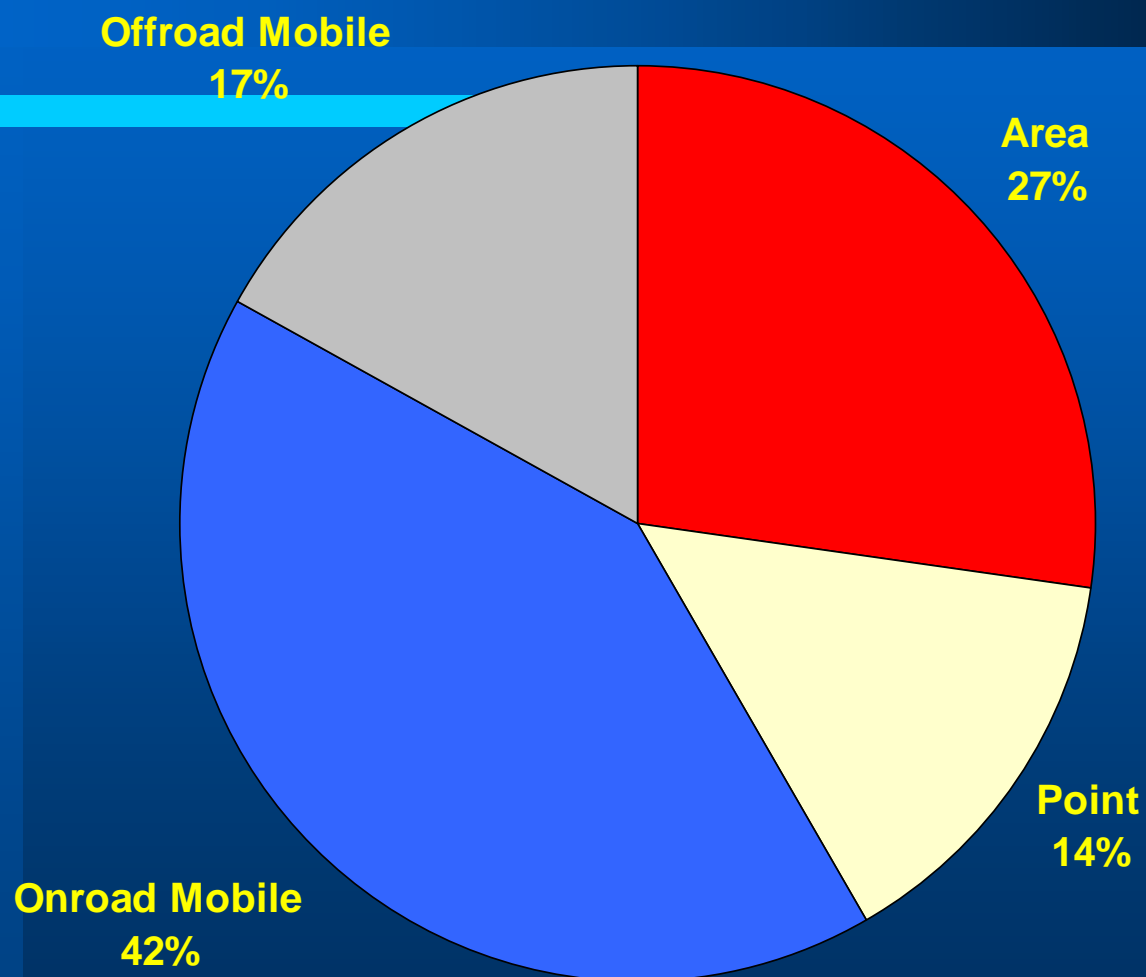
Source: MDNR APCP, Draft St. Louis Base 2 Modeling Inventory

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2002 Summer Weekday VOC Emissions in St. Louis

Total 338.7 tons/day



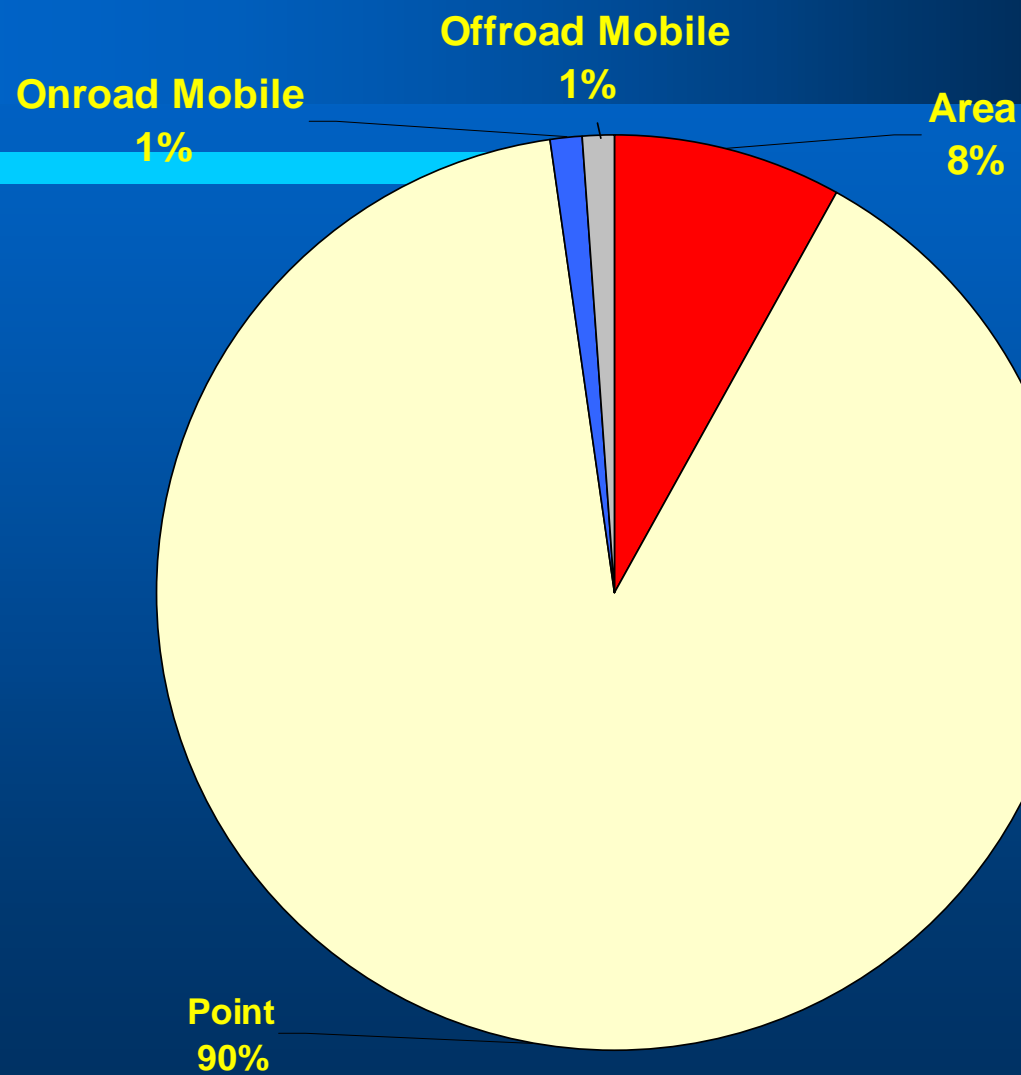
Source: MDNR APCP, Draft St. Louis Base 2 Modeling Inventory

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2002 Summer Weekday SO₂ Emissions in St. Louis

Total 595.2 tons/day

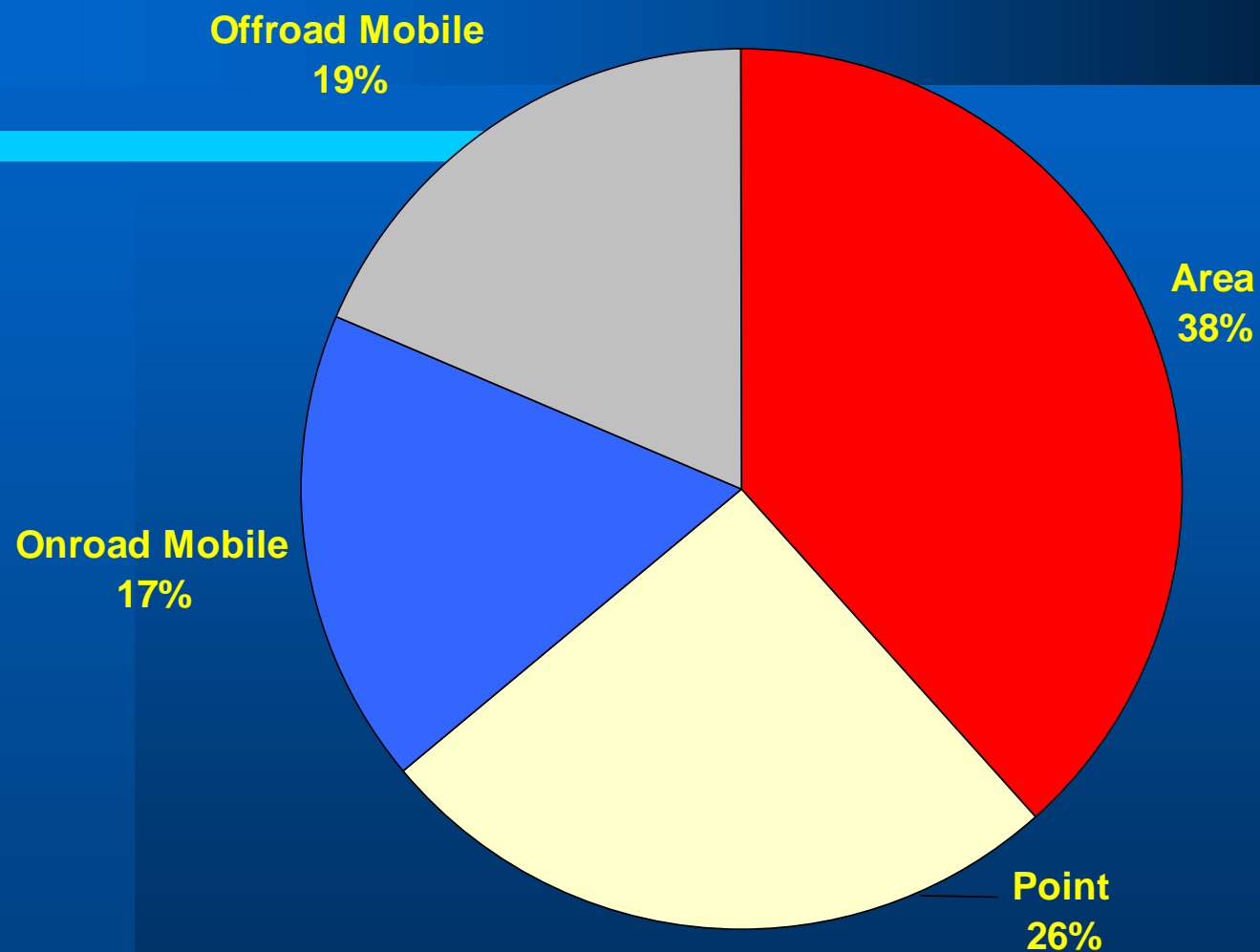


Source: MDNR APCP, Draft St. Louis Base 2 Modeling Inventory

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2002 Summer Weekday PM2.5 Emissions in St. Louis
Total 28.5 tons/day



Source: MDNR APCP, Draft St. Louis Base 2 Modeling Inventory

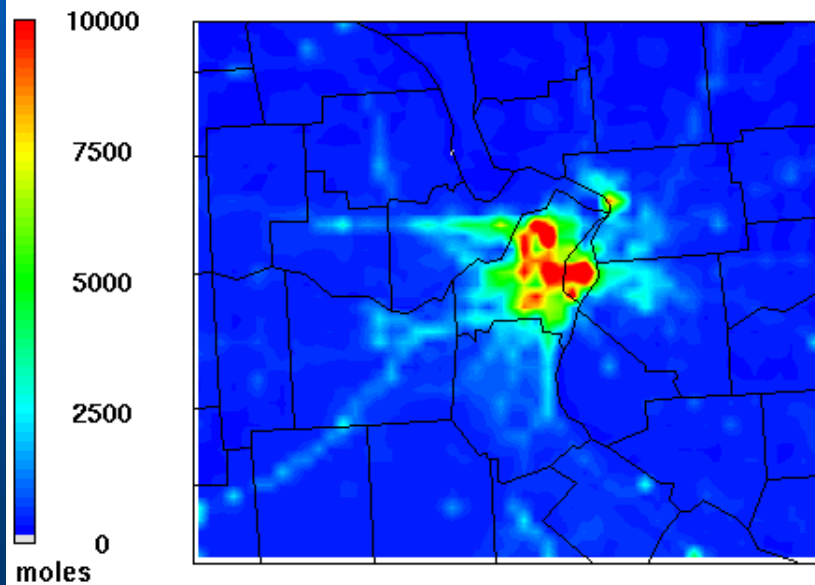
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Examples of SMOKE Gridded, Hourly Emissions

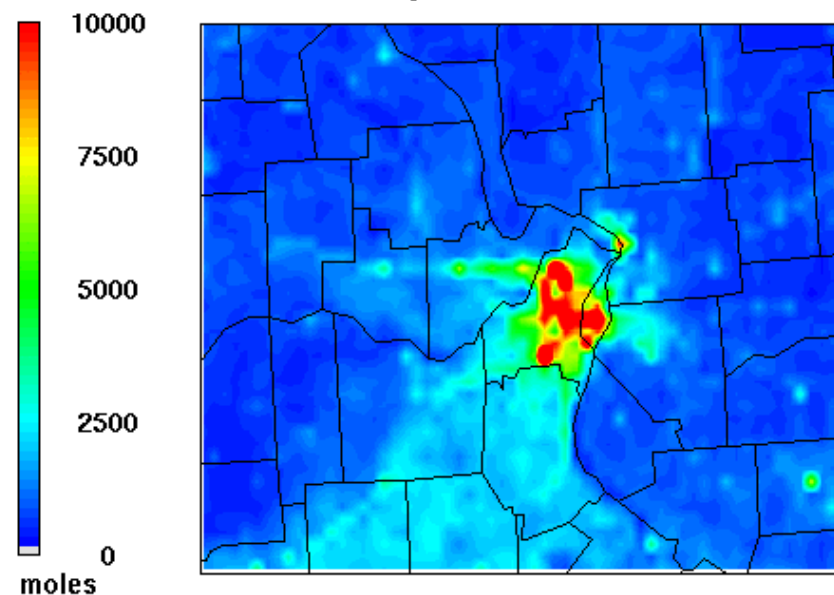
Total Low-Level VOC Emissions

Draft St. Louis Base 2 Inventory, Subregion of 4km Grid
Wednesday, June 12, 2002, 7 a.m. CDT



Total Low-Level VOC Emissions

Draft St. Louis Base 2 Inventory, Subregion of 4km Grid
Wednesday, June 12, 2002, Noon CDT



Source: MDNR ACP, Draft St. Louis Base 2 Modeling Inventory

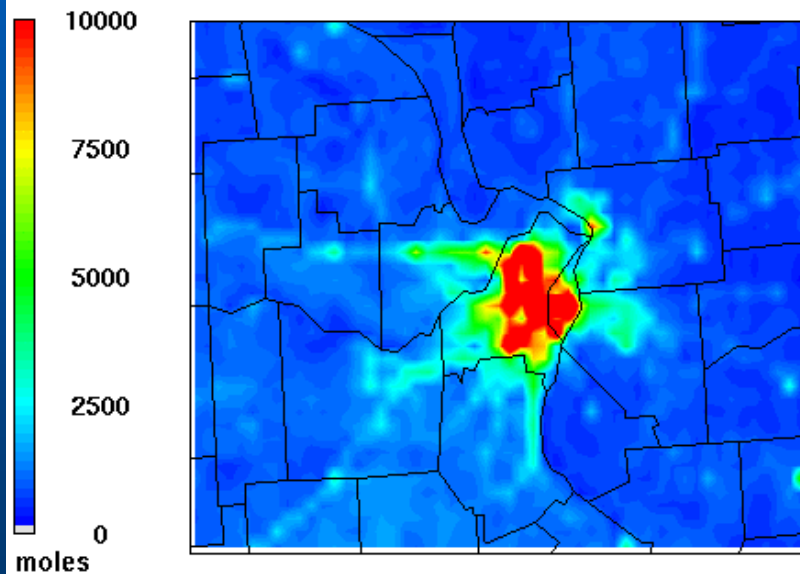
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Examples of SMOKE Gridded, Hourly Emissions

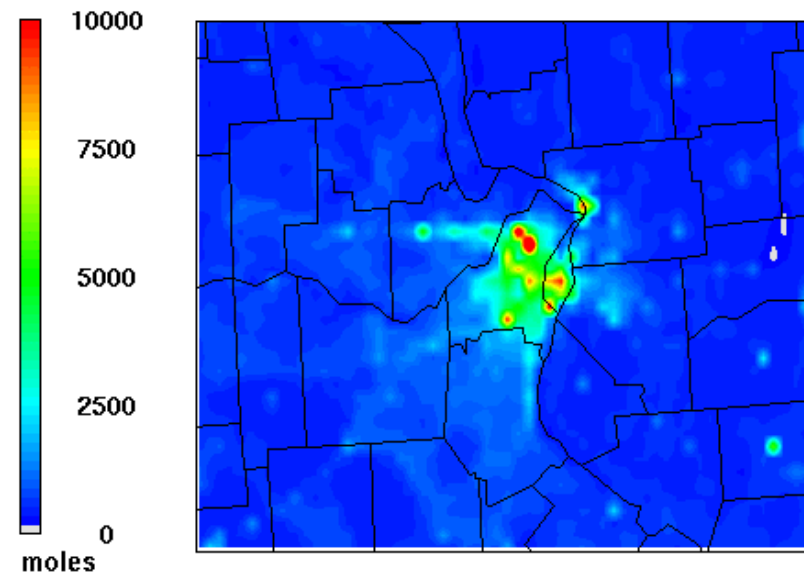
Total Low-Level VOC Emissions

Draft St. Louis Base 2 Inventory, Subregion of 4km Grid
Wednesday, June 12, 2002, 5 p.m. CDT



Total Low-Level VOC Emissions

Draft St. Louis Base 2 Inventory, Subregion of 4km Grid
Wednesday, June 12, 2002, 7 p.m. CDT



Source: MDNR APCP, Draft St. Louis Base 2 Modeling Inventory

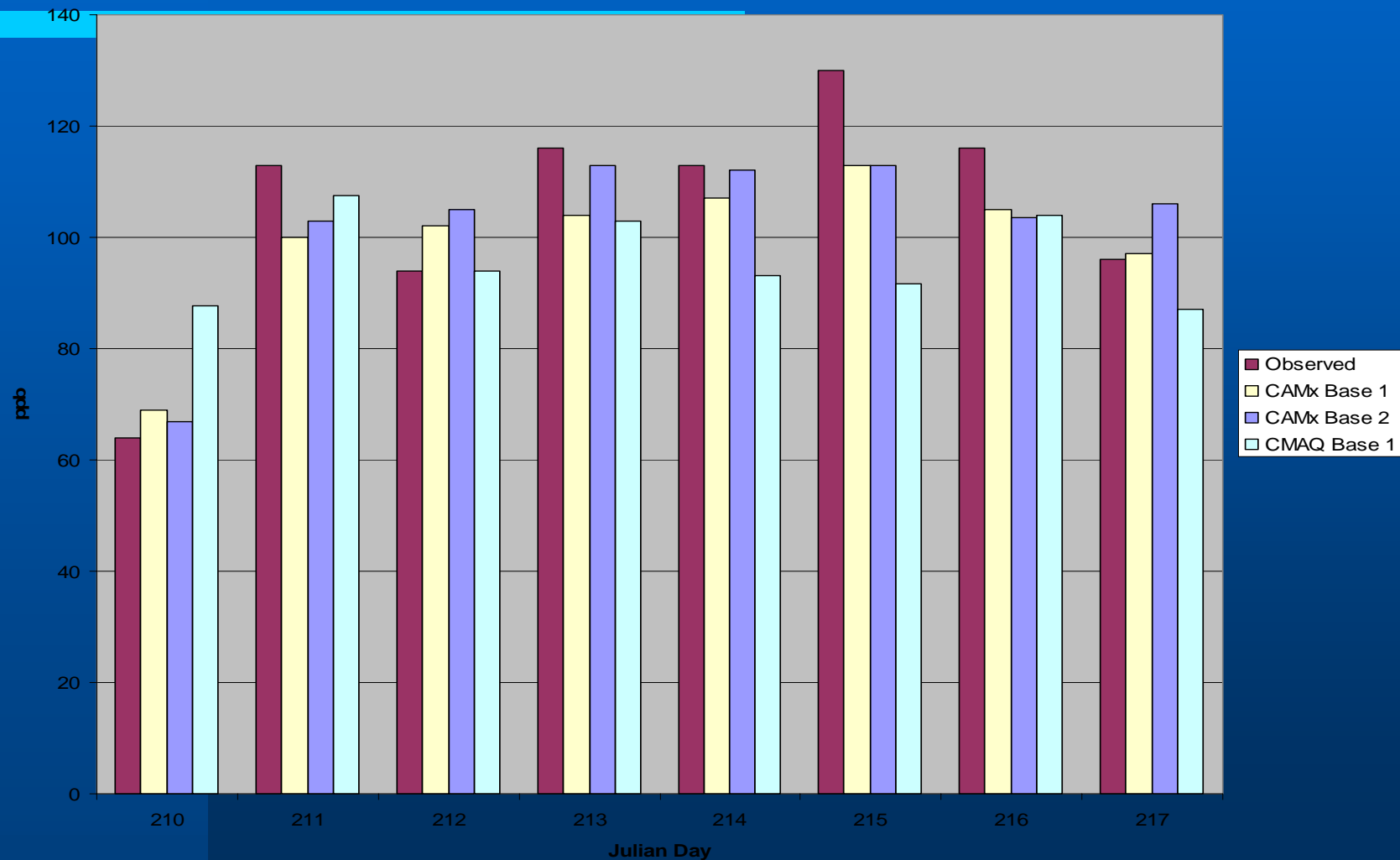
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Air Quality Modeling

- Three ozone (June, July, and July/Aug) completed initial simulations using CMAQ and CAMx
- Base 2 emissions evaluations have been completed for all three episodes for ozone CAMx
- Initial PM2.5 species modeling for Base 1 emissions has been completed for CMAQ (July and July/Aug); Base 2 modeling is underway for ozone and PM2.5 for June
- CAMx Base 2 ozone model performance is generally best for all episodes
- CMAQ PM2.5 performance is underpredicted

Peak Ozone Comparison (July/August 2002)

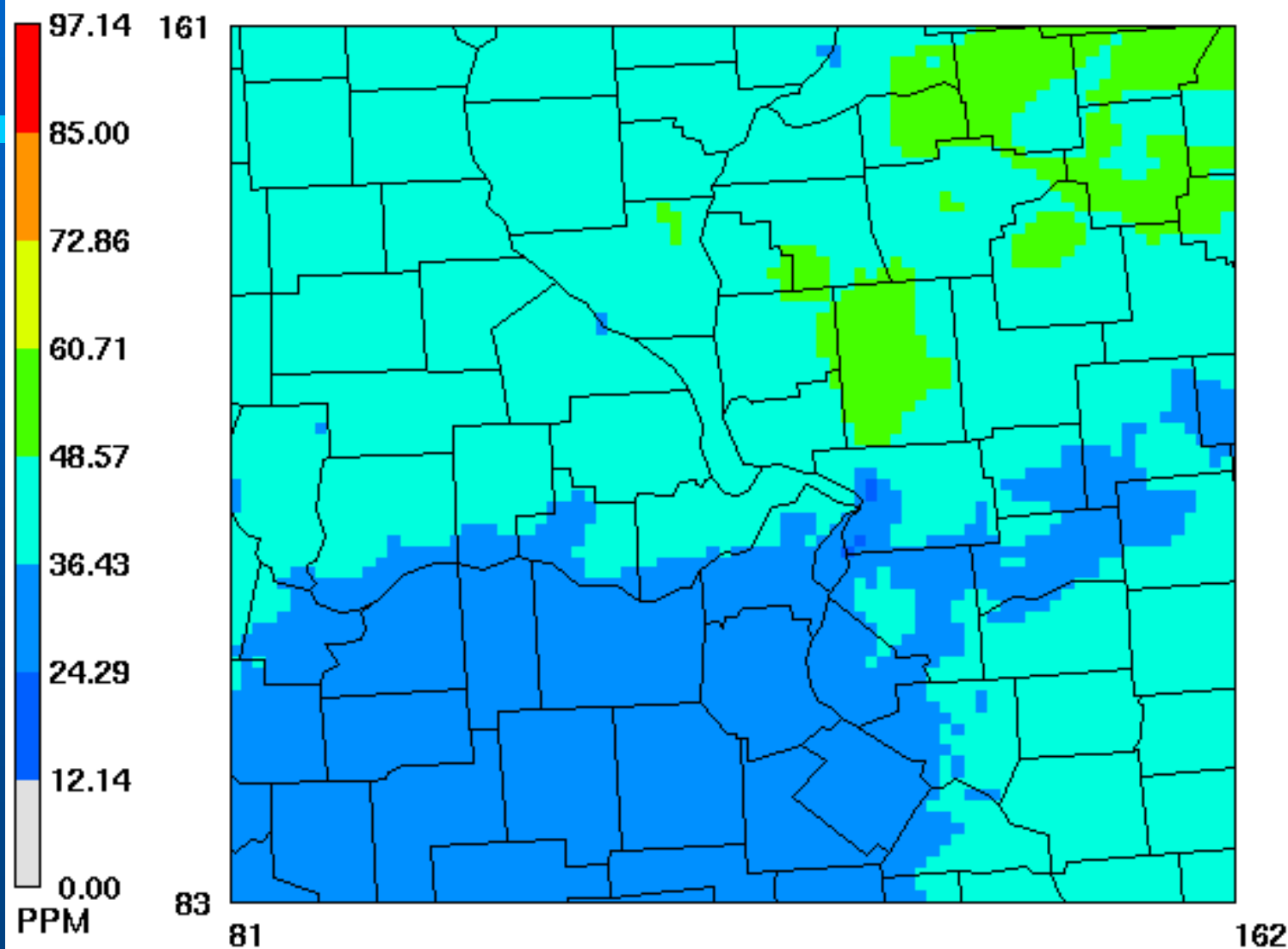


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Surface Ozone Concentration

St. Louis – 36/12/4 July 29-Aug 5, 2002
CAMx 4.11s Predicted - Mech 3



July 29, 2002 0:00:00
Min=13.91 at (133,119), Max=56.50 at (159,159)

Air Quality Modeling Status

- Initial modeling of ozone episodes complete
- Performance is generally good for CAMx simulations
- Additional work is necessary to refine inputs and complete an acceptable base case analysis for control strategy development
- PM2.5 modeling is underway and early results show poor performance

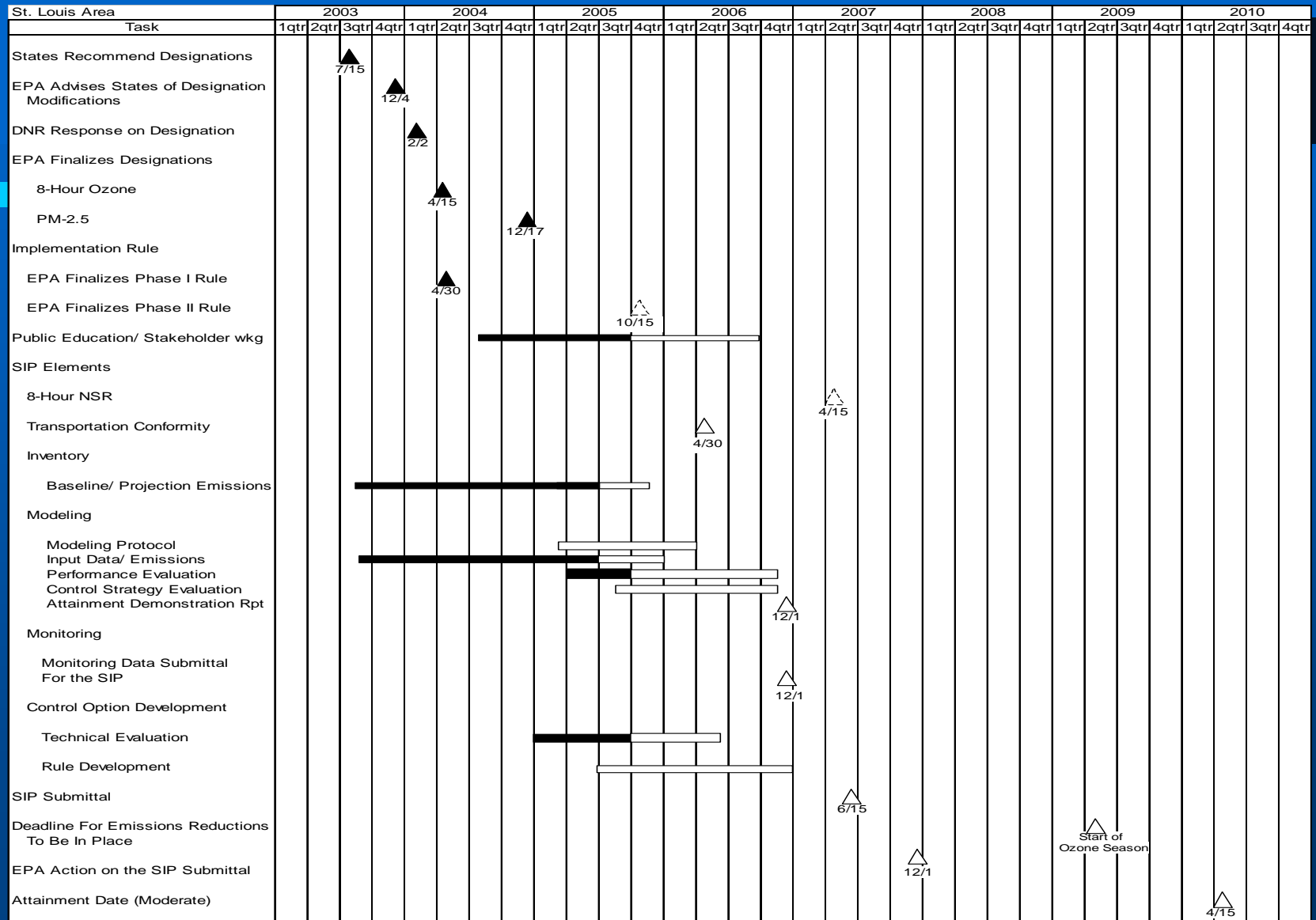
Current Emission Modeling Activities

- Continue quality-assurance effort, particular for PM2.5 inventory (SO₂, NH₃, primary PM2.5)
- Prepare 2009 base case inventory with on-the-books controls
- Provide grown 2009 point source inventory (base case) to stakeholders for review and comment

Integration: Control Strategy Model Sensitivity Designs

- On the books
- On the way
- Independent CAIR evaluation
- Utility growth options (2009 IPM, CAIR budgets, state-specific information)
- Additional emission sensitivity priorities
 - Local-scale VOC?
 - Local / Regional scale NOx
 - Sector Analysis

SIP Timeline



△ - Date to be determined



Not Completed



Completed

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Informing Control Decisions

- **St. Louis Study**
- **Other Studies**
 - **Midwest RPO / LADCO**
 - **Vistas**
 - **CenRAP**
- **PM2.5: Culpability Studies**

Final Strategy Development

- **Bi-State**
- **Technically supported**
- **Consider Costs vs. Effectiveness**
- **Management review**
- **Broad stakeholder support**
- **Minority opinions validated**
- **Formal adoption by Commission**
- **Approvable by EPA**

St. Louis Ozone & PM_{2.5} SIP Project Status

- Questions?
- Next Update



John Rustige, P.E.
October 27, 2005